lowest avian brains, with their large projecting olfactory lobes and uncovered optic lobes, and the highest avian brains, with their small, inconspicuous olfactory lobes and covered optic lobes. The difference between these two extremes is almost as great as that between the brain of a lizard and the brain of the lowest type of birds. Yet there is no impassable gulf between these two extremes. All the intervening stages are supplied by the brains of the various avian groups. In reviewing this remarkable sequence, we are almost forced to believe that this tendency towards a progressive compactness of the brain existed long before the first bird was evolved. If this be true, then this tendency towards a progressive compactness of the brain, combined with a tendency to develop all parts appertaining to vision and to atrophy all parts appertaining to smell, will account for all the major differences between the avian and the reptilian brain.

Furthermore, within this class of animals, this "progressive compactness" of the brain is a factor of taxonomic importance. So far at least as major groups are concerned, a classification based upon it alone is, for the most part, in harmony with those classifications that are based upon other structural elements of birds.

Histologically considered, the bird brain is composed of nerve fibres, nerve cells, and neuroglia. Excepting the fornix and hippocampal commissures, all the principal commissures of the mammalian brain, corpus callosum included, are found in the avian brain. Poverty of space causes the omission, in this abstract, of the various other tracts of the bird brain.

Although in the bird brain the nerve cells present a great diversity of forms, yet they may all be grouped in the following classes: ganglionic cells, Deiter's corpuscles, fusiform or flask cells, pyramidal cells, and multipolar cells. The ganglionic cells are large bi-polar cells, which are never found outside of the root ganglia. Each extremity of the cell is prolonged into a nerve fibre. One fibre passes into the brain, the other into a nerve. In addition to the ordinary cell wall, each of these ganglionic cells is surrounded by a special nuclei-bearing sheath. Deiter's corpuscles are small cells, which are supplied with so small an amount of protoplasm that ordinary preparation reveals nothing but their nuclei. These minute cells are universally distributed. In the cerebellum, however, they are densely aggregated in a single lamina; while in the optic lobes they are densely aggregated in several concentric laminæ. The remaining three types are encountered throughout the brain; but in any single nidulus some type always predominates, often to the exclusion of the other two. The flask cells resemble a flask in shape, and when stained each cell presents a faintly stained nucleus, within which is a densely stained nucleolus. Such cells are supposed to function as sensory cells. The pyramidal cells are sub-pyramidal in outline. These cells stain densely, when each one presents a densely stained nucleus, within which is a densely stained nucleolus. Such cells are probably motor in function. The multipolar cells resemble distorted, many-branched, pyramidal cells. Such cells probably act as switch stations for nervous energy.

University of Cincinnati, Dec. 31, 1891. C. H. TURNER.

A NEW SABRE-TOOTHED TIGER FROM THE LOUP FORK TERTIARY OF KANSAS.

IN a collection of Loup Fork Tertiary fossils obtained by the writer from northern Kansas, is a right upper canine of *Machœrodus*, apparently different from that of any of the known species of that genus.

The remains of several feline animals have been described from the Loup Fork, one of them (*Felis maxima*, Scott) being the largest of all known *Felidæ;* but none referred to the genus *Machœrodus* has been announced. It may, however, yet appear that the *F. maxima* itself, which Professor Scott has but provisionally referred to the genus *Felis*, is a machærodont.

The Loup Fork canine includes the entire root and neck and the basal portion of the crown. As nearly as it is possible to judge, it represents an animal about as large as the puma, but it must be borne in mind that the size of an animal cannot be very positively and closely estimated from a part so highly specialized and so subject to variation in the ratio of its size to that of the body as is the canine in this genus. In any event, the tooth indicates an animal smaller than any of the known American Pleistocene species, unless it be *M. gracilis*, Cope, and considerably larger than the European Miocene *M. palmidens*, de Blainville.

As compared with the larger American species of *Machœrodus* (*M. necator*, etc.), *M. gracilis* is characterized by the more compressed form of the basal portion of the upper canine; and this compression is said to be a marked feature. In the Loup Fork species, on the contrary, that tooth has greater relative thickness than in *M. necator*, the thickness of the tooth, at base of crown, being related to its breadth as 1 to 1.65, while the corresponding ratio in *M. necator* (taken from Cope's illustrations) is 1 to 2.2. In *M. neogœus* the ratio, derived from the measurements given by Burmeister, is 1 to 2.33.

The Loup Fork species may be known as *Machœrodus crassidens*.

The canine of *M. crassidens* presents a gentle curvature and has its posterior cutting edge compressed and denticulated. Whether the anterior border was of similar character is uncertain. The form of a point-like downward prolongation of the surface of fracture on the anterior border of the crown may have been determined, when the tooth was broken, by the presence of a compressed border, but, if so, the contour of the preserved part of the crown does not indicate it. It is, at least, certain that a denticulate carina did not extend so far from the apex on the anterior as on the posterior border.

DIMENSIONS.

	Inches.
Breadth of crown of canine at base	1.14
Thickness of same	.69
Breadth of crown 1.5 inches above base (about)	.83
Thickness of crown at same (about)	.46
Length of root of canine (to origin of denticulated keel)	2.44
Length of canine, as restored (approximate)	5.45

Should new material prove that only the posterior margin of the canine is denticulated, the species would, in this respect, resemble the *Machœrodus nestianus* of the upper Pliocene of Italy. F. W. CRAGIN.

Colorado Springs, Col.

NOTES AND NEWS.

THE Pennsylvania State Board of Health, at the instance of the Governor of Pennsylvania, has issued an invitation to the other State and the more important city boards of health, and to the American Public Health Association, to join in a conference with the officers of the World's Columbian Exposition at the city of Chicago, with the view to making an exhibit of the objects, methods, and results of the work of sanitary officials in this country.

— Mr. Charles S. Peirce has tendered his resignation as Assistant in the United States Coast and Geodetic Survey, to take effect Dec. 31. Mr. Peirce was first attached to the Survery about thirty

years ago. During the greater part of the time he has had charge of its operations relating to the determination of the force of gravity. Some of the results of his investigations have been published as appendices to the Annual Reports and have embodied contributions of great importance to science. It is understood that Mr. Peirce will continue to furnish the Survey from time to time special discussions of topics related to the subject to which he has devoted so many years.

— The routes, both northern and southern, now formally adopted by the principal transatlantic steamship companies are shown on this month's Pilot Chart issued by the United States Hydrographic Office. The northern routes remain in force until the middle of January, but steamers that take their departures from Sandy Hook Light-vessel, Boston Outer Light, Fastnet, or Bishop's Rock, on or after the 15th, follow the southern routes, which then remain in force till the middle of July next. As stated last month, on the chart, five steamship companies (the Cunard, White Star, Inman, Guion, and National) have adopted these routes to and from the Fastnet, and the following companies have now come into the agreement (taking the great circle between Bishop's Rock and the Banks): North German Lloyd, Hamburg-American, Companie Générale Transatlantique, and Red Star. It will be remembered that the Pilot Chart recommended that the Channel steamers adopt the same routes (west of the 20th meridian) as the Queenstown steamers, but these companies have decided to follow the great circle direct to the Grand Banks. The objection to this course is that the region within which eastward and westward bound vessels are liable to encounter one another is broader than in case the point of junction is shifted farther east, say to the 20th meridian, while the distance saved is comparatively slight (only six miles for the northern and nine miles for the southern routes). Possibly at some future time a compromise will be made by which the junction will be fixed at some point that may be mutually agreed upon (say about the 15th meridian in latitude 51° north). Until such an arrangement is made by the companies interested, the routes already adopted and actually in force will be shown on this Chart.

— A correspondent of the London *Spectator*, writes os follows: I have studied the habits of the scorpion for many years, and have often noticed how very sensitive scorpions are to the most delicate sound, musical or otherwise. Under the thorax the scorpion has two comb-like appendages, which are the antennæ (pectinatæ). It is pretty well settled by physiologists and entomologists that in insects the antennæ represent the organs of hearing. These delicate structures are easily affected by the vibrations of sound, and there can be no doubt whatever that they are also affected by sounds quite inaudible to the human ear. The slightest vibration of the atmosphere, from any cause whatever, at once puts in motion the delicate structures which compose the antennæ, to which organs insects owe the power of protecting themselves against danger, as well as the means of recognizing the approach of one another. Spiders have wonderful eyesight, but I am quite sure that the scorpion's vision, notwithstanding his six eyes, is far from being acute. It is very difficult to catch a spider with a pair of forceps, but a scorpion can be easily captured, if no noise is made. Spiders see their prey before they are caught in the web; but the scorpion makes no movement whatever to seize flies or cockroaches until they indicate their whereabouts by movements. This being the case, it can readily be understood how easily the scorpion may be roused into motion by the vibrations of music, as described in the article alluded to. If a tuning-fork be sounded on the table on which I keep my caged scorpion, he at once becomes agitated, and strikes out viciously with his sting. On touching him with the vibrating tuning-fork, he stings it, and then coils himself up, as scorpions do when hedged in. In Jamaica, the negroes believe that scorpions know their name; so they never call out, "See, a scorpion," when they meet with one on the ground or wall, for fear of his escaping. They thus indirectly recognize the scorpion's delicate appreciation of sound; but if you wish to stop a scorpion in his flight, blow air on him from the mouth, and he at once coils himself up. I have repeatedly done this; but with a spider it has a contrary effect. Music charms a snake into silence, as the experiments at the Zoo and elsewhere prove; but the agitated contortions and writhings of the scorpions when roused by the sound of the violin only prove that they are roused by the vibrations of sound caused by music, and this would happen if they were disturbed by the discordant sounds of a penny trumpet or any other unmusical instrument.

— At the recent French Surgical Congress MM. Henocque and Bazy reported the results of a series of examinations of the blood with the spectroscope made on persons who were compelled to undergo surgical operations. According to these investigations the demonstration of the quantity of hæmoglobin in the blood affords the surgeon some valuable information in cases where it is necessary to decide whether the patient's health is sufficiently good to permit of the performance of an operation which may not be urgently required. In ovariotomies and laparotomies undertaken for the removal of tumors it is of advantage to determine the degree of anæmia and the condition of nutrition by this method, so that the operator may be able to select the most favorable time for operation. The authors also made, according to the *International Journal of Surgery*, some exceedingly interesting experiments with the view of studying the effects of chloroform anæthesia upon the quantity of oxy-hæmoglobin in the blood and upon tissue metamorphosis. These investigations were carried on before, during, and after the performance of surgical operations. It was demonstrated in eight cases of major operations that chloroform actually tends to augment the quantity of hæmoglobin in the blood, unless a condition of asphyxia is produced, and that this quantity may remain stationary despite severe losses of blood. One of the constant effects of chloroform anæsthesia, however, is to retard the reduction of oxy-hæmoglobin; that is to say, it decreases tissue metamorphosis. These phenomena therefore illustrate that chloroform does not exert a toxic influence on the blood, although it has a marked effect in retarding the vital chemical processes in the body. In cases of sudden death at the commencement of chloroform anæsthesia a complete arrest of tissue metamorphosis takes place, and to this, in the authors' opinions, should be attributed the extraordinary severity of this form of syncope. They also believe that these facts demonstrate the advantage of determining before operation whether an individual tendency to retarded tissue metamorphosis be present. In striking contrast to the results obtained by MM. Bazy and Henocque, however, Dr. Mikulicz found that the prolonged administration of chloroform produced a decrease of hæmoglobin even in operations unattended with loss of blood. This fact simply illustrates the wide discrepancy in the results obtained by different investigators of the same subject.

— In a bulletin just published by the Entomological Division of the Cornell University Experiment Station, Professors J. H. Comstock and M. V. Singerland report upon a series of experiments, continued for three years, the object of which was to discover a practical method of preventing the ravages of wireworms. Some of the results of these experiments are summarized as follows: Grains of corn were coated with a flour paste containing Paris green and planted. The only apparent result was to retard the sprouting of the seeds, the wireworms apparently thriving upon the poisoned paste. The rose bug is another insect which it is practically impossible to kill with Paris green. Coating the seed corn with tar or soaking in salt brine, copperas solution, kerosene oil, or turpentine interfered with germination much more than it did with the appetite of the wireworm. Soaking in strong solution of strychnine failed to render the corn either distasteful or destructive to the worms. Starvation was found to be as ineffectual as feeding on poison, as the soil was kept entirely bare of vegetation for an entire season without reducing the number of worms. Buckwheat, Chinese mustard and rape have been recommended as crops upon which wireworms will not feed, but in these experiments the worms lived and thrived as well upon the roots of these plants as they did upon those of timothy and clover. Kerosene oil, crude petroleum and bisulphide of carbon were applied to the soil as insecticides, the kerosene and petroleum being also used in the form of emulsions. They killed the wireworms when applied in sufficient quantity to destroy all vegetation also.

Their use was found impracticable on account of the cost. Many farmers believe that salt either kills wireworms or drives them deeper into the soil beyond the roots of crops, and a series of carefully planned experiments were made to test this theory. The results showed that in order to destroy wireworms salt must be used at the rate of about eight tons to the acre, or over one per cent of the soil to a depth of four inches must be salt. Half a ton of salt to the acre was found sufficient to prevent one-half the wheat from germinating, and four tons per acre, applied in July, killed all the grass in a few days. In soil salted at the rate of 1,000 pounds per acre the worms were found, after some months, as numerous and as near the surface as in unsalted soil. Kainit, a German potash salt now used extensively as a feltilizer, has been supposed to be useful in exterminating wireworms, and the syndicate which is pushing the sale of Kainit in this country make great claims on this score; but in the Cornell experiments four to nine tons of Kainit per acre produced but little if any effect upon the wireworms in the soil. Other potash salts gave no better results. Lime, applied at the rate of 200 bushels per acre, had no effect upon the wireworms. Chloride of lime, used at the rate of nearly six tons per acre (costing about one hundred dollars per ton), was found to be quite effective. Gas lime, applied fresh and at the rate of twenty to forty tons per acre, proved partially effective. Trapping by baits produced the only results that gave any encouragement, but these baits caught, not the wireworms, but its parent, the click-beetle. The most satisfactory trap was a wad of fresh clover, dipped in Paris green water and placed under a board. These experiments were made in cages in such manner that the conditions could be absolutely controlled and the results accurately determined. Their negative results may be of great value to farmers by preventing the waste of time and money in trying useless methods of prevention. The only hope of a practicable remedy the investigators hold out to the farmers is that by fall plowing the worms may be disturbed at a critical period of their existence, when disturbance means death. They recommend plowing as soon as possible after wheat harvest, pulverizing immediately and thoroughly with the harrow, and seeding with wheat or rye in September, followed by not more than one or two crops of grass or clover, this to be plowed under in the summer as before. It will take several years of this method of short rotations to exterminate the worms, as they live for three years in the worm stage, and can only be injured by plowing at a certain period, but farmers who practise this method have little or no trouble from wireworms.

— At the recent annual meeting of the American Folk-Lore Society, in Washington, D. C., Rev. J. Owen Dorsey read a paper, entitled, "Nanibozhu in Siouan Mythology." At the previous annual meeting of the Society (in New York), a paper was read by Professor A. F. Chamberlain of Clark University, on "Nanibozhu among the Otchipwe, Mississagas, and other Algonkian Tribes." (*Journal American Folk-Lore*, for July–September, 1891, pp. 193–213). Mr. Dorsey's paper was designed to show the points of agreement and difference (so far as Nanibozhu is concerned) in the mythologies of the two linguistic stocks of families, the Algonkian and the Siouan. In the preparation of Mr. Dorsey's paper, the author consulted the myths of the Omahas, Ponkas, Kansas or Kaws, Osages, Iowas and Otos, all of which were collected by himself for the Bureau of Ethnology, and the Dakota myths of the late missionary, S. R. Riggs, and those in the Bushotter collection, these last consisting of two hundred and fifty-seven texts written by an Indian in the Teton dialect of the Dakota language. In Algonkian mythology, Nanibozhu, Manabush, or the Great Hare (sometimes called the Manito of winter), is a single character, easily identifiable. But in Siouan mythology we find several characters, each one of whom resembles the Algonkian Nanibozhu in one or more respects. The principal characters thus known to the Omahas and Ponkas are the following: 1. The Rabbit, the great friend of the Indian race (answering to the Badger in Dakota mythology). 2. I shti-ni-ke, the enemy of the Rabbit, the great Deceiver, a malevolent being. His Dakota counterpart, I-kto or I kto-mi in Teton, and Un-kto mi in Santee Dakota, is often a clown, a "jolly good fellow" deceived by the Rabbit, malevolent on some occasions. The Omahas call I-shti-ni-ke the "Black Man," and they and the Ponkas now apply his name to any species of ape or monkey. The Dakotas give the name of Ikto or Unktomi to the spider. 3. Ha-ghi-ge, a very cunning person, who wounds two water gods in order to avenge the death of his little brother, meets I-shti-ni-ke, when the latter is disguised as He-ga, the Buzzard, learns his secret power, and then kills him; kills the water gods whom he had wounded; is chased by the other deities, but escapes by becoming a large rock; restores his brother to life for a season; and has other adventures. The other characters who resemble Nanibozhu are as follows: In Dakota myths, the Badger figures instead of the Rabbit, and the Blood-Clots Boy takes the place of the Rabbit's son, the orphan and Wears-a-plume-in-his-hair. In the myths of the Omahas it is the orphan who kills I-shti-ni-ke, but the Ponkas refer that act to the Rabbit's son. Wears a-plume in-his-hair was the conqueror of the "Bad Men," magicians, three of whom he killed; he sought the survivor, but did not recognize him in his disguise as a beautiful woman. The woman induced the hero to rest his head in her lap, and while he slept she changed him into a mangy dog, and took the hero's shape. In the course of time, the hero was restored to his own shape. He changed the bad man into a dog, and then killed him. The Omaha and Ponka myths referred to in this paper are given in full in their respective originals (with free and interlinear translations) in "Contributions to N. A. Ethnology," Vol. 6, which has just been published. The paper on Nanibozhu will probably appear in a future number of the *Journal of American Folk-Lore*.

— In a recent number of *The Illustrated American* is an illustrated article on the Museum of Natural History at South Kensington, which was first thrown open to the public on Easter Monday, 1881. Some years ago the British Museum had become so overstocked in certain departments that it was deemed necessary to erect another structure, to contain all objects connected with natural history, and Parliament voted three hundred and ninety-five thousand pounds (nearly two million dollars) for the purpose. Alfred Waterhouse was the architect chosen to carry out the work. The architecture may be termed Decorated Norman, and in some respects it is unique. The whole edifice is cased with terra cotta, and the doorways and windows are ornamented with columns designed from objects of natural history—two features that have provoked much criticism. It has been charged, says *The Illustrated American*, that the tint of the terra cotta is not suitable for making the various articles in the museum stand out in relief; that it was a mistake to bring in close proximity the real objects of natural history and the conventional representation of them adopted by architects; and that the crowding together on the same column or moulding representations on one scale, of microscopic and gigantic organisms, inhabitants of sea and land, was unwarrantable in a building designed for educational purposes. Complaint has also been made that the great hall is semi-ecclesiastical in style. The south front of the building is six hundred and seventy-five feet long. There are three stories, in addition to the basement. The central hall is one hundred and fifty feet long, ninety-five feet wide and sixty feet high. Along its two sides are twelve arched recesses. The floor is in. laid with mosaics of Italian marble. At the north end of the hall is a wide handsome staircase, which branches off, right and left, to the open corridors or side aisles on either hand upon the first floor. Where the stairs branch a superb marble statue of Darwin has been placed. The lofty ceiling is admirably decorated, and is very effective. Along its central line there is a double row of panels, in groups of six, following the curve of the vault. On these are representations, in relief, of many species of trees, shrubs and flowering plants. Each tree decorating the central part of the ceiling occupies six panels. The height of the building makes this bold treatment absolutely necessary. But over the staircase and landing leading to the second floor the ceiling is less distant from the eye; therefore a tree is represented in each panel, and many fine details have been carefully worked out, details that were purposely omitted in the central part, as they would have been lost in the distance. One unpleasing effect of the loftiness of the arched roof is that it dwarfs the cases placed around the room.